INTRODUCTION.

In preparing this REVIEW the following data, received up to September 14th, have been used, viz: the regular tri-daily weather charts, containing the data of simultaneous observations taken at 143 Signal Service stations and 15 Canadian stations, as telegraphed to this office; 147 monthly journals and 161 monthly means from the former, and 15 monthly means from the latter; reports from 25 Sunset stations; 211 monthly registers from Voluntary Observers; 16 monthly registers from United States Army Post Surgeons; Marine Records; International Simultaneous Observations; monthly reports from Voluntary Observers in, and the local Weather Service of, Missouri; reliable newspaper extracts; special reports.

BAROMETRIC PRESSURE.

The general distribution of the atmospheric pressure, as reduced to sea-level, for the month of August, 1880, over the United States and Canada is shown by isobaric lines on chart No. II. At a few out-lying stations the means are given in figures indicating English inches. The region of highest pressure is on the Atlantic coast and farther northward than usual, covering the coast from New Jersey to North Carolina instead of being confined to the South Atlantic States. The region of lowest pressures extends from Manitoba to southern Texas. On the Pacific coast the highest pressure is as usual in Oregon, while the lowest means are reported from the interior valleys.

Departures from the Normal Values for August.—The barometric means for August, 1880, when compared with the average for the past eight years, show marked and unusual departures. Over New England, the Middle Atlantic States, the Lake region, (except the southern half of Lake Michigan) the pressures range from .04 inch to .01 inch above the normal, being .07 above at Marquette, .09 at Albany and .10 at Burlington. The Gulf States, the Upper Mississippi valley, and the greater part of the Rocky Mountain region reported means slightly below the normal, the greatest deficiency being reported from Punta Rassa, .07 below the normal.

Barometric Ranges.—The local barometric ranges, reduced to sea-level, have been very unusual and irregular, especially in those parts of the Gulf States over which the cyclones of August 12th and 29th passed, where the following ranges were reported: Punta Rassa, 0.65; Indianola and Galveston, 0.45; Cedar Keys, 0.80; Pensacola, 0.81; Mobile, 0.84; Laredo, 1.09; Brownsville, 1.79. Ranges exceeding 0.90 are reported from the Red River of the North valley, from Burlington, Vt., and North Platte, Neb. The smallest ranges in the country were: Santa Fe, 0.24; Campo, 0.32; and Key West, 0.33.

Areas of High Barometer.—During the month of August, 1880, eight areas of high pressure prevailed within the limits of the Signal Service stations. Nos. II and VIII were slight encroachments of the area of high barometer from the Pacific ocean. The remaining areas were the usual out-flows of cold air moving southeastward from the Saskatchewan region. Area No. III was marked by the first frosts east of the Mississippi river.

No. I.—This area appeared in the Upper Missouri valley during the 1st; Bismarck barometer the morning of the 2nd 0.53 above the normal. During the 2nd and 3rd, the area although remaining central in the Missouri valley extended its influence over the entire country excepting the Eastern Gulf States. During the 4th it moved gradually eastward to the Lake region, where it remained central with slight changes of pressure until the 7th, during which day moving down the St. Lawrence valley it withdrew over the Gulf of St. Lawrence during the 8th. During the prevalence of this area occurred the minimum temperatures of the month over Lake Michigan, the Ohio valley, and for the entire region between the Mississippi river and the Rocky Mountains. On the afternoon of the 5th, Cautionary Signals were ordered for the North Carolina coast; they were lowered at midnight of the 6th, having been partly justified: maximum velocities, Cape Henry, NE. 32; Chincoteague, NE. 29, and Cape Lookout, SW. 28.

No. II.—This area appeared on the North Pacific coast during the 7th, where it remained until the 16th, when it gradually dissipated. The highest barometer reading was at Olympia the afternoon of the 9th, 0.24 above the normal.

No. III.—During the 10th the barometer rose slowly over the Upper Lake region, and in the afternoon of the 11th Duluth barometer was 0.23 above the normal. The highest pressure was reported from Saugeen the afternoon of the 12th, 0.29 above the normal. During the 13th the area gradually dissipated. On the 13th Cautionary Signals were ordered from Kittykawk northward to Delaware Breakwater and at Sandy Hook and Wood's Holl. These signals were changed to Offshore on the afternoon of the 14th, and were lowered at midnight. The following maximum velocities were reported: Sandy Hook, NW. 31; Cape May, W. 25; Wood's Holl, SW. 25; Delaware Breakwater, SW. 26.

No. IV.—During the 13th and 14th the barometer rose above the mean in the Northwest, and in the afternoon of the latter date it was 0.30 above the normal at Fort Garry. Moving slowly eastward with increasing pressure, it was central during the 16th over the Lower Lake region; Kingston barometer at midnight 0.54 above the normal. Moving down the valley of the St. Lawrence, the area withdrew eastward over the Atlantic ocean during the 18th. On the afternoon of the 17th, the

highest pressure of the area was reported from Father Point, 0.55 above the normal. During the passage of this area, the minimum temperatures of the month occurred in the greater part of the Lake region, and at most stations in New England and in the Middle Atlantic States. During the 16th and 17th, frequent frosts were reported from the interior of New England and New York, from northern Michigan and the Provinces of Ontario and Quebec.

No. V.—During the 23rd the barometer rose rapidly above the normal in the Lake region; afternoon barometer at Rockliffe 0.26 above the normal. The morning of the 24th the highest pressure was at Father Point, 0.29 above the normal; during the day the area dissipated or withdrew northeastward.

No. VI.—During the 23rd the pressure rose rapidly in the northwest and by the morning of the 24th the barometer at Fort Garry was 0.43 above the normal. Moving eastward, the area was central the morning of the 25th in Ontario. Withdrawing northeastward to the Canadian Maritime Provinces, the highest pressure of the area was reported on the morning of the 26th from Father Point. The pressure remained in those provinces nearly unchanged until the 27th, when the area dissipated or withdrew southeastward.

No. VII.—During the 28th the pressure increased in the Lake region; Rockliffe barometer at midnight 0.21 above the normal. During the 29th the pressure increased in the entire St. Lawrence valley, but the central area withdrew slowly northeastward to the Canadian Maritime Provinces, where it remained with pressure nearly unchanged at the end of the month. The highest pressure of the area was reported from Father Point the morning of the 30th. 0.46 above the normal.

No. VIII.—During the 29th the pressure in California rose considerably above the mean; Sacramento and Red Bluff barometers, at midnight, 0.14 above the normal. During the 30th and 31st, the pressure remained high in California and increased in the Northern Pacific coast region, where, at midnight of the 31st, the barometer at Olympia stood at 0.23 above the normal.

Areas of Low Barometer.—During the month sixteen areas of low pressure have occurred within the limits of the Signal Service maps, only ten of which have been sufficiently definite to permit of charting. No storm has been charted entirely across the country. The marked meteorological feature of the month has been the advent of three violent cyclonic storms, a most unusual number. No. V devastated the Texas coast at the mouth of the Rio Grande river, during the 12th and 13th. In its passage over the Gulf of Mexico, the steamer *San Salvador*, long over due, was probably lost. No. X during the 18th, passed over Jamica, where it caused the loss of several lives and did immense damage to shipping, buildings, crops and other property. No. XVI, the cyclone in which the S. S. *City of Vera Cruz* was lost, moving eastward to the north of the Bahamas on the 28th, crossed northern Florida during the 29th and 30th. This storm strewed the Florida coast with wrecks and did great damage to property and growing crops. As far as has been noted the loss of life was confined to the crew and passengers of the S. S. *City of Vera Cruz*.

No I—was a continuation of area No. XII of the *July* REVIEW. Central the morning of the 1st in Minnesota, at midnight it had reached the northern part of Lake Huron, whence by a northeasterly course, it passed down the valley of the St. Lawrence during the 2nd. On the afternoon of the 1st, Cautionary Signals were ordered for Lake Michigan and the New Jersey coast, and at midnight for Lake Huron and the western half of Lake Erie. These signals were lowered during the 2nd, having been justified: maximum wind velocities, NW. 40 at Milwaukee; N. 45 at Sandusky; N. 26 at Escanaba; S. 34 at Cape May; S. 32 at Chincoteague and Delaware Breakwater; SE. 26 at Cape Henry.

No. II.—This area, apparently developing in the Gulf of Mexico, was central the morning of the 3rd in the Lower Mississippi valley: Vicksburg barometer 0.18 below the normal. Moving slowly eastward it dissipated in Florida during the 4th. In the afternoon of the 3rd, Cautionary Signals were ordered from Cape May southward to Smithville, and were lowered the following morning: maximum velocities, Cape Lookout, S. 27; Cape Hatteras, SE. 27; Kittyhawk, SW. 33; Chincoteague, S. 32.

No. III.—This area, appearing in the Northern Plateau district the morning of the 4th, moved slowly eastward to Dakota, where it was central the morning of the 6th; Bismarck barometer 0.24 below the normal. Its course thence was northeastward and beyond the Signal Service stations until the 9th, when it passed eastward through the Canadian Maritime Provinces over the Atlantic. No signals were ordered nor dangerous winds reported during the passage of this area.

No. IV.—During the night of the 10th a general fall occurred in the Plateau district and in the Pacific coast region. On the afternoon of the 10th, the lowest pressure was reported from Virginia City—0.20 below the normal, and from Ft. Keogh, Montana—0.26 below the normal; by the morning of the 11th, the depression had either filled up or moved northeastward in Manitoba.

No. V.—This storm, evidently cyclonic, apparently, developed in the Carribean sea previously to the 5th, on which date, the pressure of 29.78, with easterly wind and rain, was reported from Guadaloupe. During the 5th and 6th, strong E. to S. winds, with rain, were reported from St. Thomas, and on the 7th and 8th from Navassa; these two stations were too far northward of the centre to show any decided barometric fall. On the 6th, "a most remarkable fall of the barometer,"

(no figures given) is reported by Mr. Maxwell Hall, at Kingston, Jamaica, with squalls and rain. The steamer *San Salvador* which left Truxillo, Honduras, August 7th, is now twenty-eight days overdue, and is supposed to have been lost in the cyclone. Off Cape San Antonio, August 9th, the steamer *E. B. Ward* lost rudder and had cargo injured: and at same place, ship "Tula," August — (probably 9th), encountered severe hurricane. On August 10th, brig *Adino* was wrecked on Alecranes reef. During the night of the 10th and the morning of the 11th, the barometer fell slowly at Brownsville, but remained stationary to the northward. From midnight of the 11th the barometer sank rapidly at Brownsville, reaching, at 9:33 p. m. of the 12th, 29.69 or 0.40 below the normal; wind N. 40 miles. By 11:45 p. m. the barometer had fallen to 28.315 (1.38 inches in 2 hours 12 minutes), while the wind increased to hurricane force—anemometer blown down at 10.48 p. m., registering 48 miles; from 11:45 p. m. a calm prevailed for 1 hour, when barometer commenced rising and wind shifted to south, the centre having passed over Matamoras, several miles south of Brownsville. Moving slowly up the valley of the Rio Grande, the area was central at midnight of the 13th in Mexico to the westward of Eagle Pass. Following a northeast course, the depression filled up in western Texas during the 14th. From the 12th to 14th, exceedingly heavy rains fell in connection with this storm, as shown under the heading of *Heavy Rains*. In Brownsville, Tex., a large number of buildings were blown down and great damage otherwise done. At Fort Brown about twenty buildings were blown down, barracks badly damaged, 35 horses and mules killed. In Matamoras, over three hundred houses were blown down or rendered uninhabitable, and many others seriously damaged; two persons were killed and many injured, four seriously. Two steamboats in the Rio Grande river were sunk. At Point Isabel, eight vessels wrecked, three men lost. Ten miles of railway between Brazos, Santiago and Brownsville swept away or badly damaged. Damage in Brownsville and Matamoras and vicinity estimated at one million dollars. Cautionary Signals were displayed at Galveston and Port Eads, the morning of the 12th to the morning of the 14th. On the morning of the 13th, special telegraphic despatches were sent warning vessels against venturing that day into the southwestern Gulf. Maximum wind velocities of 64 NE. at Indianola, and 29 NE. at Galveston, reported.

No. VI.—During the 14th the barometer fell steadily in southern California, and on the morning of the 15th the lowest pressure was reported from Yuma,—0.21 below the normal. Moving slowly northward the area of lowest pressure on the morning of the 16th was at Los Angeles, —0.24 below the normal. During the day the depression gradually filled up.

No. VII.—During the 15th the pressure decreased over Colorado and New Mexico, and at midnight the lowest pressure was reported from Santa Fe, —0.17 below the normal. Moving northeastward, the area was central in the Missouri valley, with rapidly decreasing pressure during the 16th, at midnight the barometer at Breckenridge was reported 0.35 below the normal. The area thence passed northeastward into British America. At midnight of the 15th Cautionary Signals were ordered for the South Carolina and Delaware coast, and the southern half of Lake Michigan, followed in the afternoon of the 16th, by Signals for Lake Superior and the rest of Lake Michigan. These Signals were lowered on the 17th, having been generally justified; maximum velocities: Milwaukee, SE. 28; Capes Hatteras and Lookout, NE. 34; Ft. Macon, E. 28; Delaware Breakwater, NE. 25.

No. VIII.—During the night of the 17th, the barometer sank rapidly over the entire Lake region. On the morning of the 18th, an area of low pressure was central in Wisconsin; Duluth barometer, 0.21 below the normal. Moving slowly eastward, it was central in the afternoon over the eastern part of Lake Superior: Escanaba barometer, 0.24 below the normal. Its course thence was northeastward beyond the limits of the Signal Service stations. No Cautionary Signals were displayed during the passage of this area. The following high winds at scattering stations were reported: Escanaba, SW. 40; Sandusky, S. 30; Port Huron, SW. 30; Alpena, SW. 28.

No. IX.—This area appears to have sprung up from the remains of low area No. VIII. At midnight of the 18th a sharp rise was reported from the Upper Lake region, while the barometer still continued falling in the Lower Missouri valley, where this area was central on the morning of the 19th; Omaha barometer 0.24 below the normal. On that afternoon an area of low pressure extended from the Lower Missouri valley, northeastward to the Gulf of St. Lawrence. Violent thunder-storms were reported from the Lake region, with the following maximum velocities: Cleveland, N. 25; Erie, NW. 28; Grand Haven, SW. 34; Sandusky, NW. 50. On the morning of the 20th the area of low pressure covered the Lower Lake region, with no well defined centre; Buffalo, Erie and Port Huron barometers 0.32 below the normal. A new depression which appeared in Manitoba during the night of the 19th, moving southeastward during the 20th, merged into this area, and the pressure remained substantially unchanged over the Lower Lake region until the 21st, when the area moved slowly northeastward to the Gulf of St. Lawrence. No Cautionary Signals were displayed during the passage of this area.

No X—is the West India cyclone which swept with such disastrous results over the island of Jamaica during the night of the 18th of August. Additional interest attaches to this storm on account of the comparative rarity of such visitations to Jamaica. The early history of the storm is at present confined to the account furnished by the log of the S. S. *Nith*, for an extract of which this office is indebted to Mr. Maxwell Hall, of Kingston.

At noon of the 15th of August, the south point of Gaudaloupe bearing north about 3 miles, the wind as observed on board the vessel was fresh from NE., gradually increasing with hard squalls. The 16th commenced with similar conditions; at 8 a. m. the wind was E., at times backing to NE. with heavy overcast sky: at noon the vessel was in 16° 4′ N. 65° 55′ W., with less wind but sea running high and turbulent; afterward hard gale and heavy squalls, which continued, with torrents of rain, during the early portion of the morning of the 17th; toward noon of the 17th the wind moderated and veered from NE. to SE. and S.; at noon of the 17th the vessel was in 16° 10′ N. 70° 26′ W., barometer reading 29.35, wind again heavy, in squalls, with thunder and lightning; toward sunset the storm abated somewhat, but at 9 p. m. it came on with renewed force. August 18th commenced with terrific squalls from E. to SE., torrents of rain and incessant thunder and lightning; toward noon the storm increased in violence and the vessel was headed to the south: at noon she was in 16° 27′ N. 74° 57′ W., the barometer reading 29.15: at 4 p. m. the wind veered to southward and moderated; at 8 p. m. the vessel was put on her course again (toward Jamaica) and at midnight the weather was comparatively fine. Although no barometer observations are given for the 15th and 16th, it is evident that the vessel and the storm vortex were traveling westward along converging paths, the progressive motion of the latter being greater than the speed of the vessel. On the 17th the two paths were rapidly approaching each other, and on the 18th the distance between them must have been quite small. The reports from Barbadoes, Martinique and Navassa, not yet to hand, will undoubtedly throw much light upon this portion of the storm's history. At St. Thomas a slight fall in the barometer was reported on the 15th and 16th, with cloudy weather and light rains; the prevailing easterly winds increased slightly in strength and at the afternoon reports of the above dates are described as "gusty." On the Island of St. Domingo "continuous heavy rains and high winds prevailed from the 15th to the 19th" doing great damage to crops. The S. S. *Atlas*, at Aux Cayes, on the southwest coast of Hayti, left that port on the afternoon of the 18th. The captain states that while in port "the wind set in strong from the NE. and veered around to E. when the barometer (corrected) fell to 29.1. He put out to sea in the direction of Jacmel and allowed the storm to pass." Mr. Maxwell Hall, in transmitting the above, states, "it appears that two cyclones converged on Jamaica on the 18th, the more southerly one traveling at the rate of 12½ knots and the more northerly one at 23 knots an hour," and "that he is collecting material for working out this remarkable disturbance." At Kingston, Jamaica, the barometer had been in a disturbed condition since the 6th, and Mr. Hall had advertised in the daily press that Cautionary Signals would be hoisted when a storm was to be expected. Notice of the present storm, however, was posted by Mr. Hall only six hours before its arrival, for which he gives the following reasons: "(I) for many years these cyclones have passed so far south of Jamaica that they have hardly affected us, and it became necessary to make sure on the 18th that the cyclone was not proceeding as usual; (II,) absence of wind; the slow cloud-drift seeming to give another day, but we were really sheltered by the Blue Mountain Ridge, hills 7,000 feet high, to the north of us; (III,) a high velocity of progression—15 miles per hour, I believe, being above the averge." The sea at this port was disturbed on the evening of the 17th, and still further on the 18th, the waves coming from the east. The barometer at 7 a. m., (18th,) read 29.86: at 3 p. m., 29.69, when a rapid fall set in, the barometer at 9:15 p. m. reading 28.93, after which it rose to 29.40 at 11 p. m., and at 7 a. m. of the 19th had reached 29.82. Up to 8 p. m of the 18th the wind remained almost calm, light airs, (2 miles per hour), from the NW. being the highest velocity recorded: at 8:15 p. m. it was ENE. 5 miles, increasing to 10 miles at 9:15 p. m.: at 9.30 it had increased to SE., 15 and at 9:45 to S. by E., 20. It then rapidly increased, and at 10 p. m., was S., 60: 10:15, S., 80: 10:30, S., 69: 10:45 to 11, SSW., 70; 11:15, SSW., 50; 11:30 to midnight, WSW., 20. The weather during the 17th, and morning and afternoon of the 18th, was close, warm and cloudy, the clouds moving from the NE: heavy rain set in during the evening and continued to near midnight. The following newspaper items, arranged geographically in three sections, will serve to indicate the severity and path of the storm over the Island of Jamaica. Beginning at the southeast corner and taking the section south of the mountain range we have:—(I.) along the coast—Plantain Garden river—hurricane during the night of the 18th did serious damage. Morant Bay, church, hospital and chapels completely destroyed, three vessels ashore, one life lost. Yallahs, 59 houses destroyed, three lives lost, schooner Kate badly handled off the southeast coast Wednesday night. Port Royal, all wharves destroyed. Port Henderson and Apostles Battery in ruins. Fort Augusta reported under water. Old Harbor Bay, church and houses destroyed. (II.) In the interior from St. Marys in the east, to Manchester in the west. Up Park Camp, near Kingston, military barracks destroyed; $50,000 damage. Creighton, church blown down. Newcastle, barracks blown down, one man killed. Mt. James district, houses blown down. St. Thomas in the Vale, houses blown down, crops ruined, one life lost. Spanishtown, storm burst about 9 p. m. and passed over with circular sweep, buildings and trees damaged. St. Dorothy district, storm severe, two distinct earth-quake shocks, six places of worship destroyed. St. John's, 40 houses and crops destroyed. Chapelton, rained all day, at 6 p. m. began blowing from a northerly direction, and changing to NW. continued to 2 a. m. on the 19th; violent from 9 p. m. to midnight, buildings and crops destroyed. Alley P. O., Vere Co., north breeze, blowing down canes, river very high, rainfall during storm 0.85 in.: during 18th, 1.54 inch. Mandeville, 18th, slow rain; evening, increasing wind; 8 to 9 p. m., cyclone commenced; midnight, lulled, buildings damaged. In the mountains—Trinityville, Blue Mountain valley, gale experienced in all its severity; when day dawned the district was a scene of desolation, few houses standing, &c. At Cinchona plantation, elevation 5,000 feet, near the head of the Yallahs river—August 17th,

high wind, 2.44 in. rain; 18th, morning, wind N. and NW., strong gusts, heavy rain; afternoon, wind higher and sweeping with heavy rain from NE.: 3:30 p. m., barometer, unreduced, (Negretti and Zambra's), 25.11; 4:30 p. m., 25.00, temperature 65°; 7 p. m., gale; 7.15 p. m., 24.80, 64°; 8 p. m., 24.75, 60°, lull; stables and out-buildings blown down; 11 p. m., gale moderated, but shortly after blew with increased force from E. to SE; 19th, 3 a. m., lull succeeded by heavy downpours of rain till nearly day-light: rain-fall during the 19th was 20 inches. (III.) Along the north coast beginning at the east:—Manchioneal, storm raged: Port Antonio, strong wind during 17th and morning of 18th; 2 p. m., of latter date, increased to full hurricane; 3 to 4 p. m., violent rain-storm; 6 p. m., houses blown over; 7 p. m., hurricane, wind about E. by N., force increasing to 11 p. m.; 19th, 12.20 a. m., wind had changed to SW., decreasing; 1 a. m., finished by a strong blow from S. The S. S. *Tropic* in San Antonio harbor, made the following record:—18th, 6 a. m., barometer 30.00, wind E. fresh; 11 a. m., 29.90; 12 m., 29.80; 1 p. m., 29.40; 2 p. m., 29.00, heavy rains; 2.30 p. m., 28.90, wind veering to southerly; 4 p. m., 28.60, SE., heavy gale; 11 p. m., 28.40, S. heavy gale; 12 midnight, storm-centre passed to southward, barometer rising rapidly—heaviest wind from southward lasting one hour. Portland, severe storm, acres of trees and several peasant's houses blown down. Buff Bay, severe hurricane on night of 18th, destroying all houses; St. George district, 116 houses wrecked, 2 persons drowned. Annotto Bay, terrible hurricane all Wednesday night, numbers of houses in ruins. Port Maria, awful time from 7 p. m., 18th to 3 a. m. 19th, boats ashore, houses blown down, banana cultivation ruined for 12 miles around. Richmond, St. Mary's, houses blown down by hundreds, 4 lives lost. Ocho Rios, tremendous damage by cyclone, loss estimated by thousands of pounds sterling. St. Ann's Bay, 18th, wind strong from N. all day; 11 a. m., barometer 29.80; 4.45 p. m., 29.56; 9 p. m., fearful hurricane until near day-light; five coasting vessels driven ashore, wharves washed away and buildings damaged. A second report from St. Ann's says the gale increased in violence until about 12.30 a. m., 19th, when a lull took place; at 1 a. m. the wind veered to WSW. and lasted, as violently as before, until 4 a. m.; during storm rumbling sounds were heard which were attributed to two distinct shocks of earthquake. Dry Harbor, two boats wrecked and several houses blown down. Falmouth, 3 sloops ashore and buildings damaged. Montego Bay, terrible storm on 18th. These reports show the whole of the eastern portion of the Island to have been swept by the hurricane, while the extreme west and southwest portions, namely, the counties of Hanover, Westmoreland and St. Elizabeth, appear to have escaped. The storm area was probably limited on the west by a line running from Portland Point, through Mandeville to Montego Bay. P. Benito Vines, S. J., of Havana, forwards the following observations made at Manzanillo and Santa Cruz, on the south coast, and at Nuevitas, on the north coast of Cuba, which, he says "refer to the cyclone that crossed the eastern Provinces of this Island on the 19th." Manzanillo, 18th, 9 p. m., barometer 29.95, wind NE., force 2, light rain commenced: 19th, 7 a. m., 29.55, NE., 3, squally; 8:10 a. m., 29.30, E., 1, ugly; 8:15 a. m., 29.30, SE., 3 and 4, squally; 9:15 a. m., 29.40, S., 2, squally; noon, 29.70, SW., 1, cloudy. Santa Cruz, 18th, midnight, 29.92, NE., hard and variable; 19th, 8 a. m., 29.74, N., hard; at 9 a. m., NNW., fresh and 10 a. m., NW.; noon, barometer 29.71, after which it rose and at night-fall read 29.85, wind W., fresh. Nuevitas, 19th, 11 a. m., 29.40, NE., hurricane; noon, 29.50, NE., hurricane; 4:30 p. m., 29.50, S., light, the hurricane having passed northwards. Mr. Chas. Hasselbrink, Havana, reported on August 21st, as follows: "Since the 14th, we have been under the influence of light or moderate cyclonic movements; on the night of the 16th and on the 17th, sudden anti-cyclonic rise of the barometer, with fresh breeze; on the 19th, light squalls and clouds coming with moderate rapidity from the E; night of 19th, clear sky." On the 20th, the reports from the Signal Service stations in Florida, seemed to indicate the existence of a barometric depression at some distance to the eastward, and on the 21st, the barometer at the Bermudas fell to 29.85.

No. XI.—The pressure on the Pacific coast decreased on the 20th, and remained slightly below the normal with no defined centre until the 22nd, when, at midnight, a sharp fall was reported from Visalia; barometer on the morning of the 23rd 0.18 below the normal. During the 23rd the pressure was decidedly below the normal in the entire Plateau region; on the morning of the 24th the barometer was 0.29 below the mean at Virginia City, after which the depression gradually filled up.

No. XII—developed in the Saskatchewan district north of Montana, whence it moved eastward in British America, too far north of the Signal Service stations to permit its course to be accurately charted. The lowest pressure reported was from Fort Garry, 0.35 below the normal, in the afternoon of the 21st.

No. XIII.—At midnight of the 22nd a sharp barometric fall was reported from Dakota; Deadwood barometer 0.22 below the normal. Moving eastward through Minnesota the area was central, the morning of the 24th, in Upper Michigan, whence by a northeasterly course it passed into British America. Cautionary Signals were ordered the afternoon of the 24th, for the entire Upper Lake region and the western half of Lake Erie, where brisk winds at occasional stations had been reported. These signals were lowered at noon of the 25th, having been partly justified; maximum velocities: Duluth, N., 33; Sandusky, W., 37.

No. XIV.—During the 26th the pressure fell in the Missouri valley; midnight barometer at Yankton 0.25 below the normal. Moving slowly northeastward the area was central, the morning of

the 27th, in Minnesota; St. Paul barometer 0.21 below the normal. Central that afternoon in southwestern Wisconsin, it moved, during the night, northeastward into British America. No signals were displayed during the passage of this area. The only case of high wind reported was Milwaukee, N. 32.

No. XV.—During the night of the 27th the pressure fell rapidly in the northern Plateau district; afternoon barometer at Virginia City 0.24 and at Salt Lake City 0.21 below the normal. The lowest pressure remained in Utah or Idaho until the 30th, when it was transferred to the Eastern Rocky Mountain Slope. Missing reports prevent its centre being located. The highest winds of the month were on that day reported in that district as follows: North Platte, N. 44; Cheyenne, NW. 32; Ft. Keogh, W. 40; Deadwood, S. 25. During the 31st the area moved northeastward into Manitoba.

No. XVI.—A sufficient number of reports have not been received at this date (September 13th) to enable the accurate charting and description of this storm. No Signal Service reports from August 29th to 31st south of Jacksonville are yet at hand. This storm evidently formed to the northward of San Domingo and passed eastward to the north of the Bahamas. The hurricane which passed over the Bermudas on the 29th and 30th may possibly have been an offshoot of this area, but this is hardly probable, as on August 25th, in latitude 25° 30′ N. the brig *M. A. Doran* reported heavy NNE. gale veering to NW., with barometer rapidly falling from 30.40 to 29.50; bearing southward she avoided the hurricane but met at midnight heavy squalls and bad sea. On the succeeding day, August 26th, schooner *S. A. Snow* was wrecked by this hurricane 128 miles SE., of the Bermudas. On the same day brig *St. Jose* was dismasted "south of Bermudas," no position given. Ship *Sunrise* on the 26th, in 26° N., 69° W., fell into the SW. quadrant of a violent hurricane, moving NNW. These reports indicate that the Bermuda hurricane originated south of 25° N., and to the eastward of 61° W., and curved southward of the Bermudas. The Florida hurricane was located on the 27th in 25° 50′ N., 74° 10′ W., where it overtook the steamship *Santiago* at noon; hurricane wind NNW., NE. sea; barometer 29.80. At midnight wind shifted to very heavy SW., and high cross seas; barometer 29.49; after which wind and sea moderated. On the 28th the steamship *New Orleans* was struck by the cyclone at 8 p. m., 40 miles ENE., of Jupiter Inlet about 27° N. In both these cases winds backed from NNW. to SE., showing that the hurricane passed to the northward. On the same date the *Morgan City*, of Florida coast, experienced a hurricane from the W., backing to SE., and lasting till the 29th; barometer fell from 30.00 to 28.79. On the 29th the steamer *Vera Cruz* foundered on the Florida coast off the St. John's river, many lives lost. A number of other vessels were wrecked or disabled on the Florida coast between Jupiter Inlet and St. John's river. During the 29th and 30th the hurricane passed across Florida. At Cedar Keys the storm was one of the worst ever known. On the morning of the 30th the wind reached its maximum,—64 miles NE. registered, after which time the registering apparatus was disabled. During the 30th and 31st, 6.73 inches of rain fell. The lowest barometer reading reported was 29.40 at 2 p. m., of the 30th. One vessel, the bark *Proteus*, at Cedar Keys, was dismasted and otherwise damaged. Several buildings were blown down and others damaged; on the railway between Cedar Keys and Fernandina several serious washouts occurred. During the 31st the storm moved slowly northeastward through Florida into Alabama with rapidly increasing pressure and decreasing violence. At Pensacola the highest wind SW. 32 and lowest barometer 29.33 were reported on the 31st. At midnight of the 28th Cautionary Signals were ordered for all Florida stations except Pensacola, and on the following day for Pensacola, Mobile, Port Eads, and as far north as Sandy Hook. Owing to interruption of telegraphic communication, signal orders failed to reach Cedar Keys and Key West. On the 29th special messages announcing the cyclone were sent to all Atlantic and Eastern Gulf seaports. The signals from Savannah to Wilmington and Norfolk were lowered on the 30th, and at other stations on the 31st. These signals were justified, except on the North Carolina coast; maximum wind velocities were reported as follows: Cedar Keys, NE., 64; Barnegat, NE., 42; Pensacola, SW., 36; Cape May, NE., 36; Delaware Breakwater and Jacksonville, NE., 32; Key West, SW. 32.

INTERNATIONAL METEOROLOGY.

Three International charts, Nos. IV, V and VI, accompany the present Review. They are for the months of *July*, 1880 and *December*, 1878.

On chart No. IV will be found the probable course of the principal low barometer areas over the North Atlantic Ocean during the month of *July*, 1880. Three of them, II, IV and V, are extended tracks of low areas, II, V and VI of the July REVIEW, chart I, and appear to have curved northward before reaching the 50th meridian. Four of them, I, III, VI and VII appear to have originated to the east of the 20th meridian on the 1st, 6th, 14th and 17th respectively. Reports at present to hand indicate continued high pressures and light winds over the central portion of the ocean, (between the parallels of 30 and 50) from the beginning of the month to the 22nd. On the 23rd a decided fall set in from the northward, over the eastern portion, which during the 24th gradually extended westward to 45° W. forming an extensive area of low barometer, which on this day probably included the whole of the Atlantic north of the Azores. During the 25th and 26th it appears to have moved southeastwards towards the British Channel and its path is marked upon the chart as No. VIII. On the 27th, another area, No. IX seems to have developed to the west of Ireland and subsequently to have moved eastward toward the North Sea. On the 30th and 31st quite high pressures were again recorded over mid-